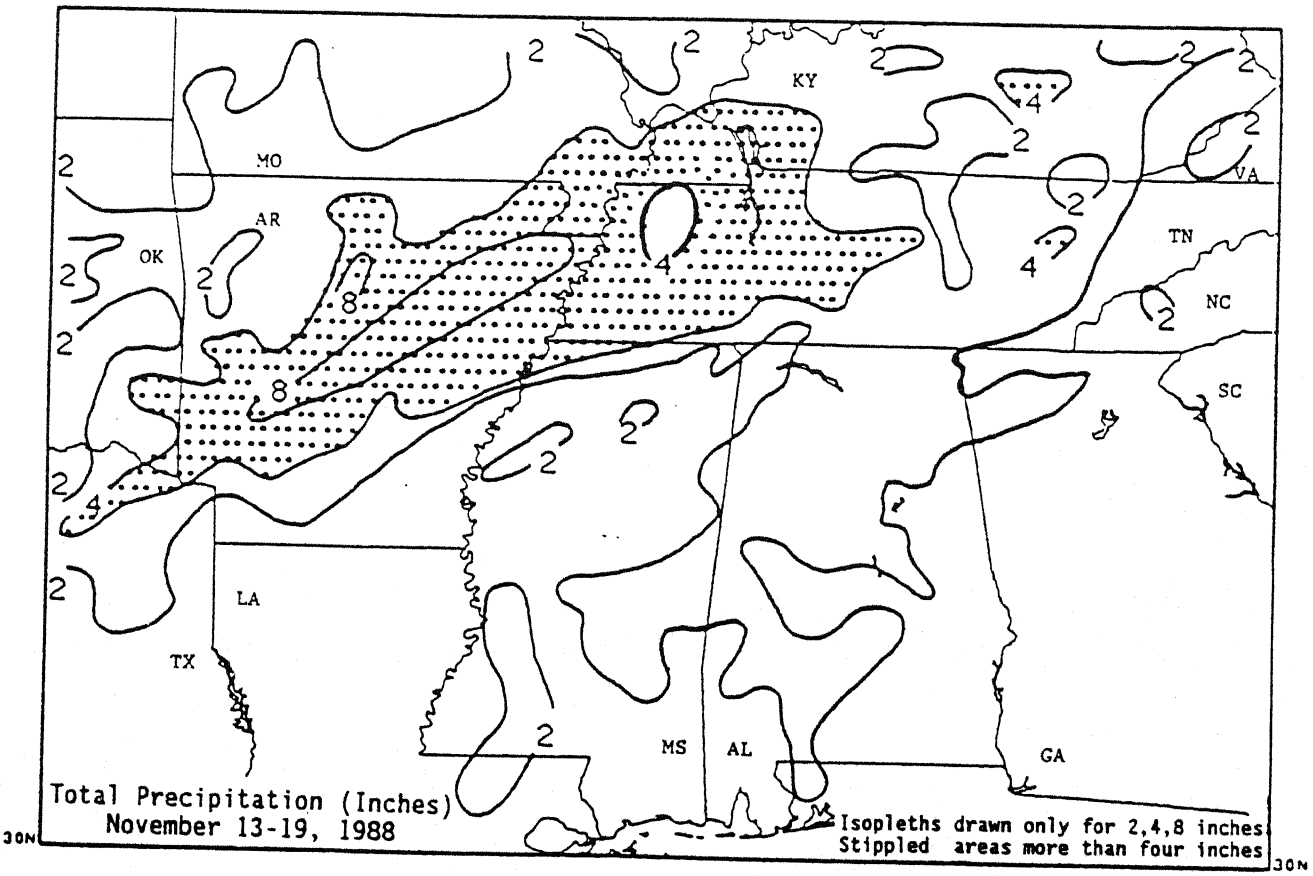
CLIMATE ANALYSIS CENTER

WEEKLY CLIMATE BULLETIN

No. 88/47 Washington, DC November 19, 1988



HEAVY THUNDERSTORMS, ASSOCIATED WITH TWO COLD FRONTS, DUMPED LARGE AMOUNTS OF PRECIPITATION ON PORTIONS OF THE LOWER MISSISSIPPI AND TENNESSEE VALLEY REGIONS LAST WEEK.

UNITED STATES DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE - NATIONAL METEOROLOGICAL CENTER

WEEKLY CLIMATE BULLETIN

Editor:	David Miskus
Associate Editor:	Paul Sabol
Contributors:	Jeffrey D. Logan
	Keith W. Johnson
	Vernon L. Patterson
Graphics:	Robert H. Churchill
	John P. Dee
	Richard J. Tinker

This Bulletin is issued weekly by the Climate Analysis Center and is designed to indicate, in a brief, concise format, current surface climatic conditions in the United States and around the world. The Bulletin contains:

Highlights of major global climatic events and anomalies.
U.S. climatic conditions for the previous week.
U.S. apparent temperatures (summer) or wind chill (winter).
Global two-week temperature anomalies.
Global four-week precipitation anomalies.
Global monthly temperature and precipitation anomalies.
Global three-month precipitation anomalies (once a month).
Global twelve-month precipitation anomalies (every 3 months).
Global temperature anomalies for winter and summer seasons.
Special climate summaries, explanations, etc. (as appropriate).

Most analyses contained in this Bulletin are based on preliminary, unchecked data received at the Center via the Global Telecommunication System. Similar analyses based on final, checked data are likely to differ to some extent from those presented here.

To receive copies of the Bulletin or change mailing address, write to:

Climate Analysis Center, W/NMC53
Attention: Weekly Climate Bulletin
NOAA, National Weather Service
Washington, DC 20233
Phone: (301) 763-8071

GLOBAL CLIMATE HIGHLIGHTS

MAJOR CLIMATIC EVENTS AND ANOMALIES AS OF NOVEMBER 19, 1988
(Approximate duration of anomalies is in brackets.)

1. South Central United States:
TORNADOES, SEVERE THUNDERSTORMS RAVAGE AREA.
Unusually severe weather -- tornadoes and severe thunderstorms -- raked much of the region from eastern Texas to eastern Tennessee. Up to 293.4 mm (11.51 inches) of rain were reported. See front cover and U.S. Weekly Climate Highlights for more details [Episodic Events].

2. Southwestern United States:
WARM CONDITIONS DIMINISH.
Temperatures were near or below normal in much of the southwestern United States as unusually warm conditions ended. See U.S. Weekly Weather Highlights [Ended at 5 weeks].

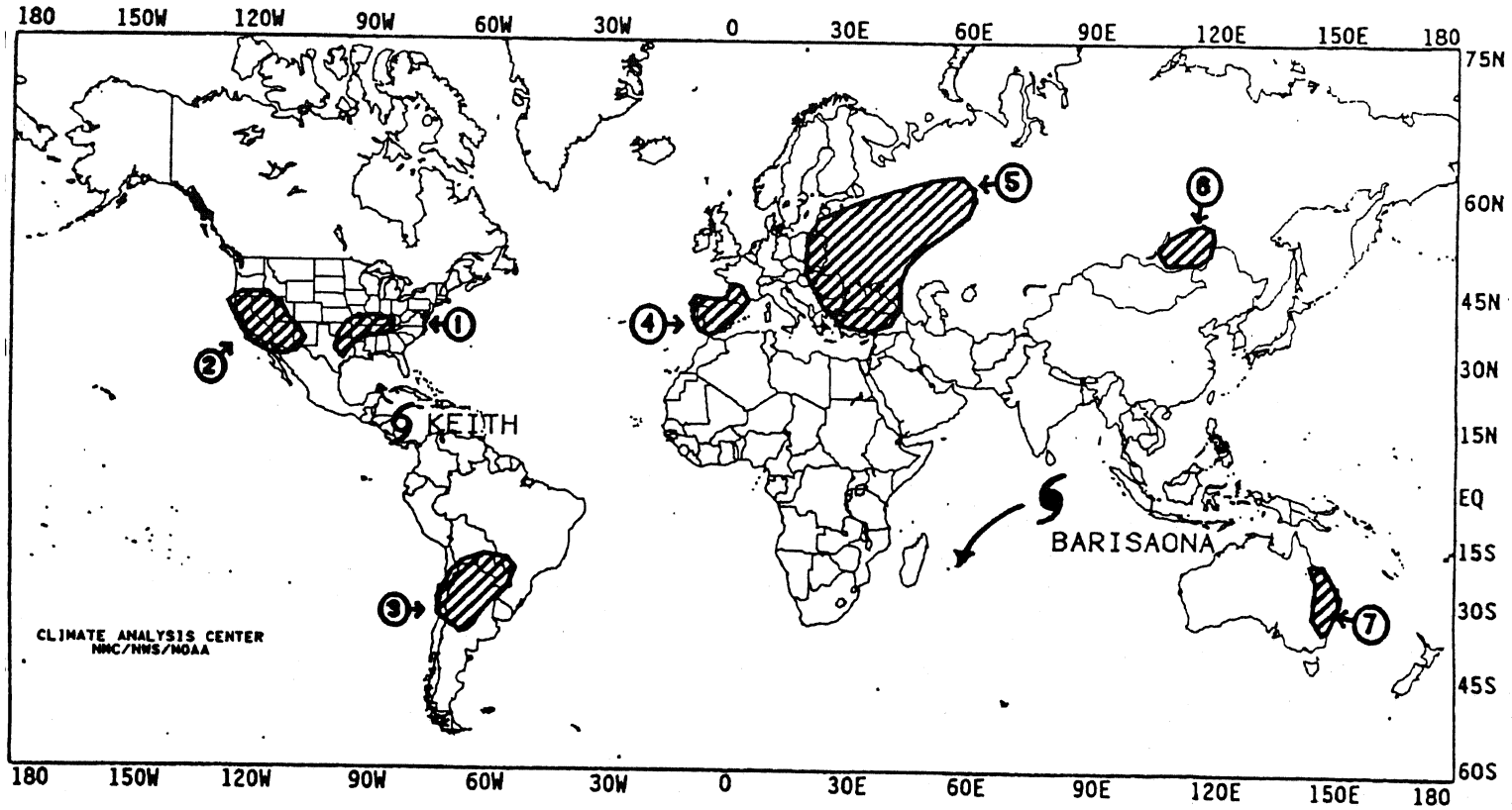
3. Argentina:
BELOW NORMAL PRECIPITATION PERSISTS.
Little or no precipitation was observed at most stations in northern Argentina; however, as much as 67.0 mm (2.64 inches) of rain were measured to the south [21 weeks].

4. Spain and Portugal:
AREA UNUSUALLY WARM.
Temperatures averaged up to 4.8°C (8.6°F) above normal as unusually warm conditions prevailed [7 weeks].

5. Eastern Europe:
UNUSUALLY LOW TEMPERATURES OCCUR.
Unseasonably cold conditions were reported in much of eastern Europe from northern Poland and northern European Soviet Union to Greece and Turkey. Temperatures were as much as 11.0°C (19.8°F) below normal [4 weeks].

6. Eastern Asia:
WARM CONDITIONS REMAIN.
A late season warm spell, with temperatures as much as 11.7°C (21.1°F) above normal, persisted across southeastern Siberia [6 weeks].

7. Australia:
RAINS EASE DRYNESS.
As much as 103.0 mm (4.06 inches) of precipitation fell on the coasts of southeastern Queensland and northeastern New South Wales and provided some relief from dryness there [Ending at 6 weeks].



Approximate locations of the major anomalies and events described above are shown on this map. See other maps in this Bulletin for current two week temperature anomalies, four week precipitation anomalies, longer term anomalies, and other details.

UNITED STATES WEEKLY CLIMATE HIGHLIGHTS

FOR THE WEEK OF NOVEMBER 13 THROUGH NOVEMBER 19, 1988.

Late season tornadoes occurred in the central United States as two powerful storms moved across the Nation. Heavy snow, as much as three feet, fell at some mountain locations. Once over the mountains both storms intensified as cold air and Gulf moisture combined to cause an outbreak of severe weather. On Tuesday 49 tornadoes were spawned by the first storm as it passed through Arkansas, Kansas, Missouri, Illinois, and Iowa. A second storm brought up to a foot of rain to parts of Arkansas and Kentucky. Tornadoes were reported in the lower Mississippi Valley at the end of the week.

According to the River Forecast Center over two inches of rain fell at stations along the Oregon Coast and in the Cascade Range. Amounts over an inch were confined to the remaining parts of Washington, Oregon, and northwestern California west of the Cascades (See Figure 1) and to extreme northern Utah, extreme southeastern Idaho, and extreme western Wyoming. Further east the two storms dropped up to 11.51 inches of rain in Arkansas (see Table 1). Amounts exceeded two inches across all of Arkansas, southern Missouri, southern Illinois, most of Kentucky, western Tennessee, and extreme northwestern Mississippi. Other areas with an excess of two inches of precipitation include the Washington, DC vicinity, east central Mississippi and west central Maine and adjacent parts of New Hampshire. Areas with an inch or more include the strip from northeastern Texas and eastern Oklahoma to the Middle Atlantic States, most of New England, and the Midwest from southern Illinois to southwestern Michigan. Moderate amounts of precipitation were reported in Iowa, Minnesota, and Wisconsin. Little or no precipitation occurred across most of the Intermountain West, the Southwest, and the High Plains from western Texas to the Dakotas.

The greatest positive temperature departures (over $+6^{o}F$) occurred in the southeastern United States, where many daily record highs were set, and in the north central states from northeastern Missouri and eastern Iowa to southern Michigan and northern Ohio (see Table 2 and Figure 2). Temperatures averaged between $3^{o}F$ and $6^{o}F$ above normal in much of the eastern and south central United States; however, near normal temperatures prevailed in the Middle Atlantic States and most of New England. Above normal temperatures were reported on the Hawaiian Islands. Colder air invaded the West and the north central states. The greatest negative temperature departures (between $-6^{o}F$ and $-14^{o}F$) occurred in parts of North Dakota and Montana and in southwestern Utah (see Table 3). Colder than normal temperatures prevailed across much of the remainder of the West. In Alaska, bitterly cold air remained for the sixth consecutive week as temperatures were as much as $23^{o}F$ below normal.

Figure 1

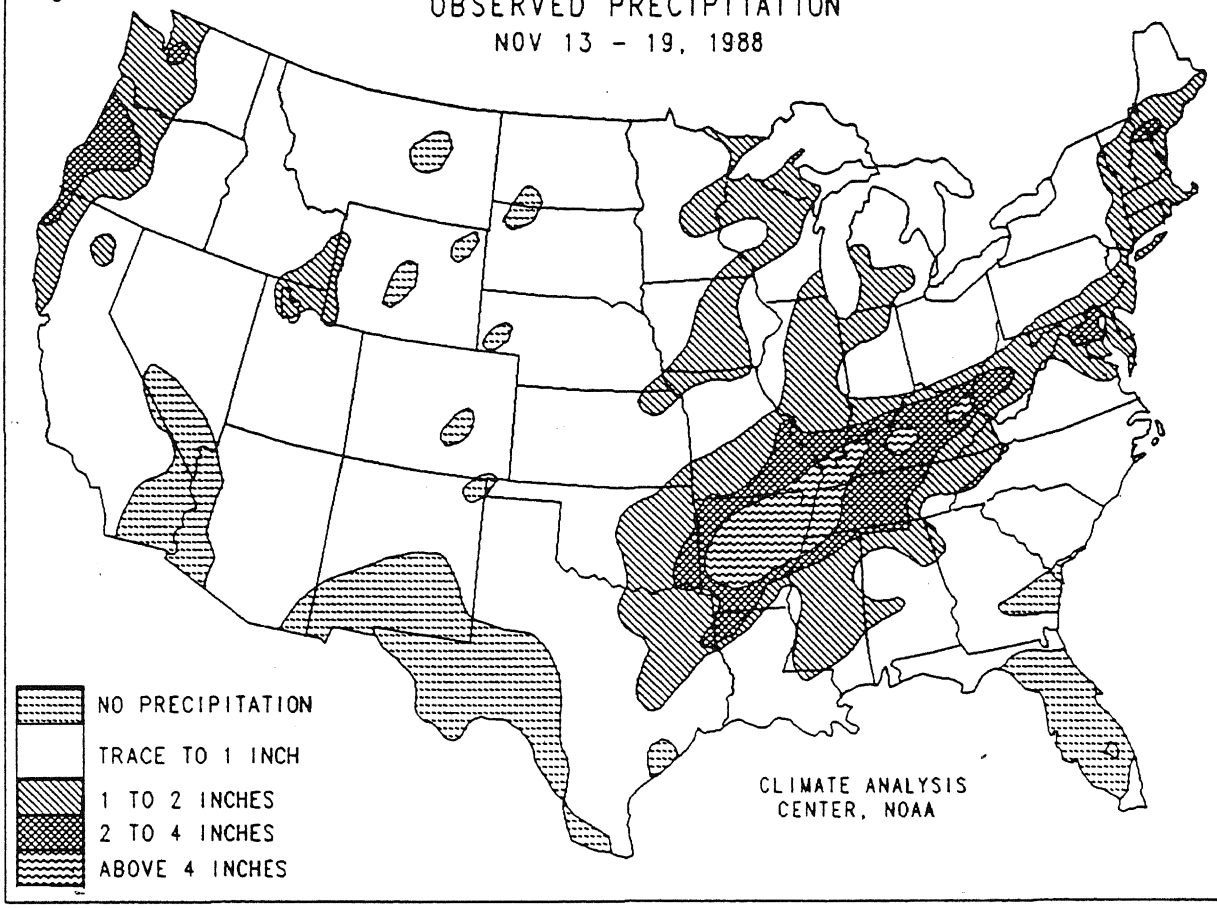


Figure 2

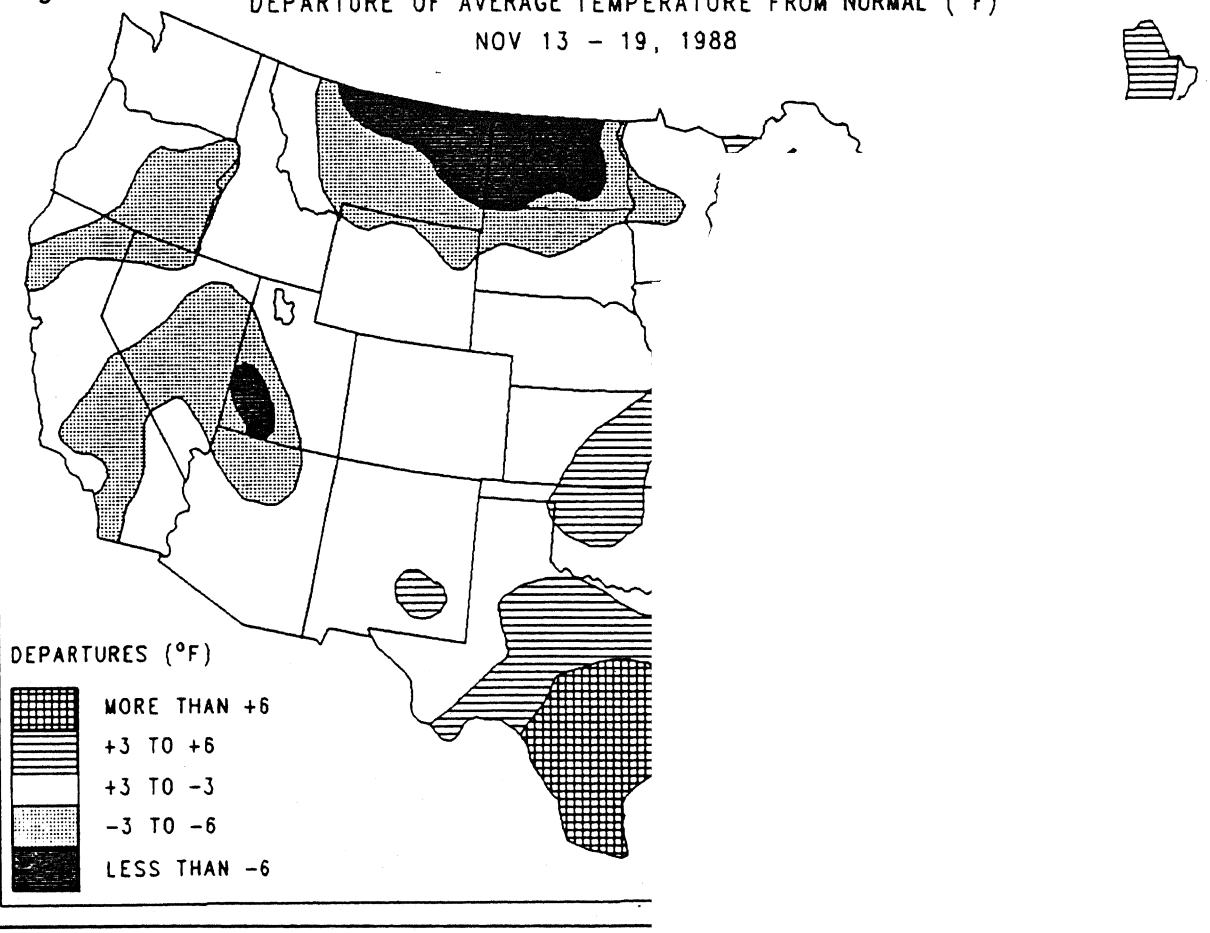


TABLE 1. Selected stations with two or more inches of precipitation for the week.

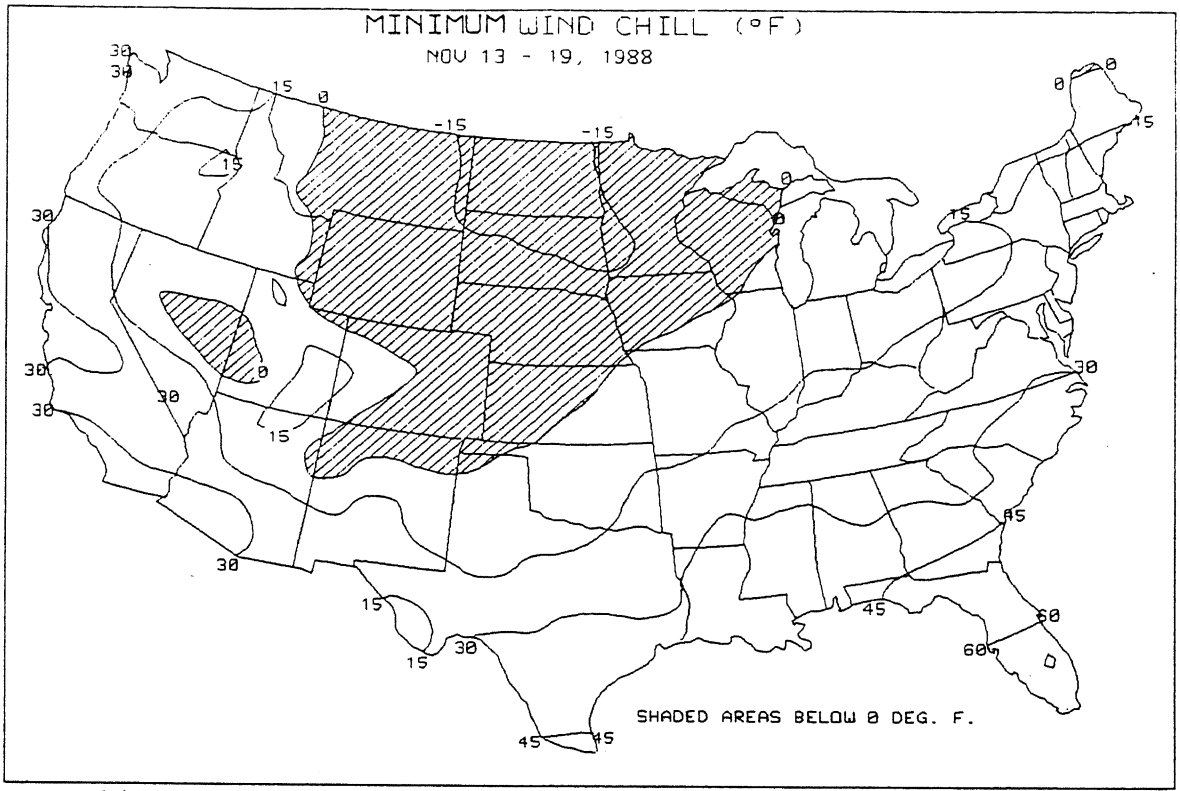
Station	Amount(In)	Station	Amount(In)
Little Rock, AR	11.51	Hopkinsville/Campbell, TN	2.63
Little Rock AFB, AR	10.49	Mt. Washington, NH	2.43
Jonesboro, AR	7.61	Nashville, TN	2.39
Memphis NAS, TN	6.99	North Bend, OR	2.37
Memphis, TN	6.50	Dulles Airport, VA	2.35
Blytheville AFB, AR	6.42	Lexington, KY	2.35
Paducah, KY	5.70	Cape Girardeau, MO	2.35
Hilo/Lyman, HI	5.64	Davison AAF, VA	2.32
Jackson, TN	4.82	Huntington, WV	2.30
Yakutat, AK	3.69	Washington/National, DC	2.28
West Plains, MO	3.60	Charleston, WV	2.28
Bowling Green, KY	3.59	Louisville/Standiford, KY	2.22
Harrison, AR	3.44	Fayetteville, AR	2.21
Meridian NAS, MS	3.41	Andrews AFB, MD	2.21
Evansville, IN	3.05	Jackson, KY	2.20
Fort Smith, AR	2.87	Huntsville, AL	2.10
Sitka, AK	2.76	Eugene, OR	2.09
Longview/Gregg Co, TX	2.72	Sault Ste. Marie, MI	2.07
Annette Island, AK	2.72	St. Louis, MO	2.06
Meridian, MS	2.69	McAlester, OK	2.03
Adak, AK	2.63		

TABLE 2. Selected stations with temperatures averaging greater than 8.0°F ABOVE normal for the week.

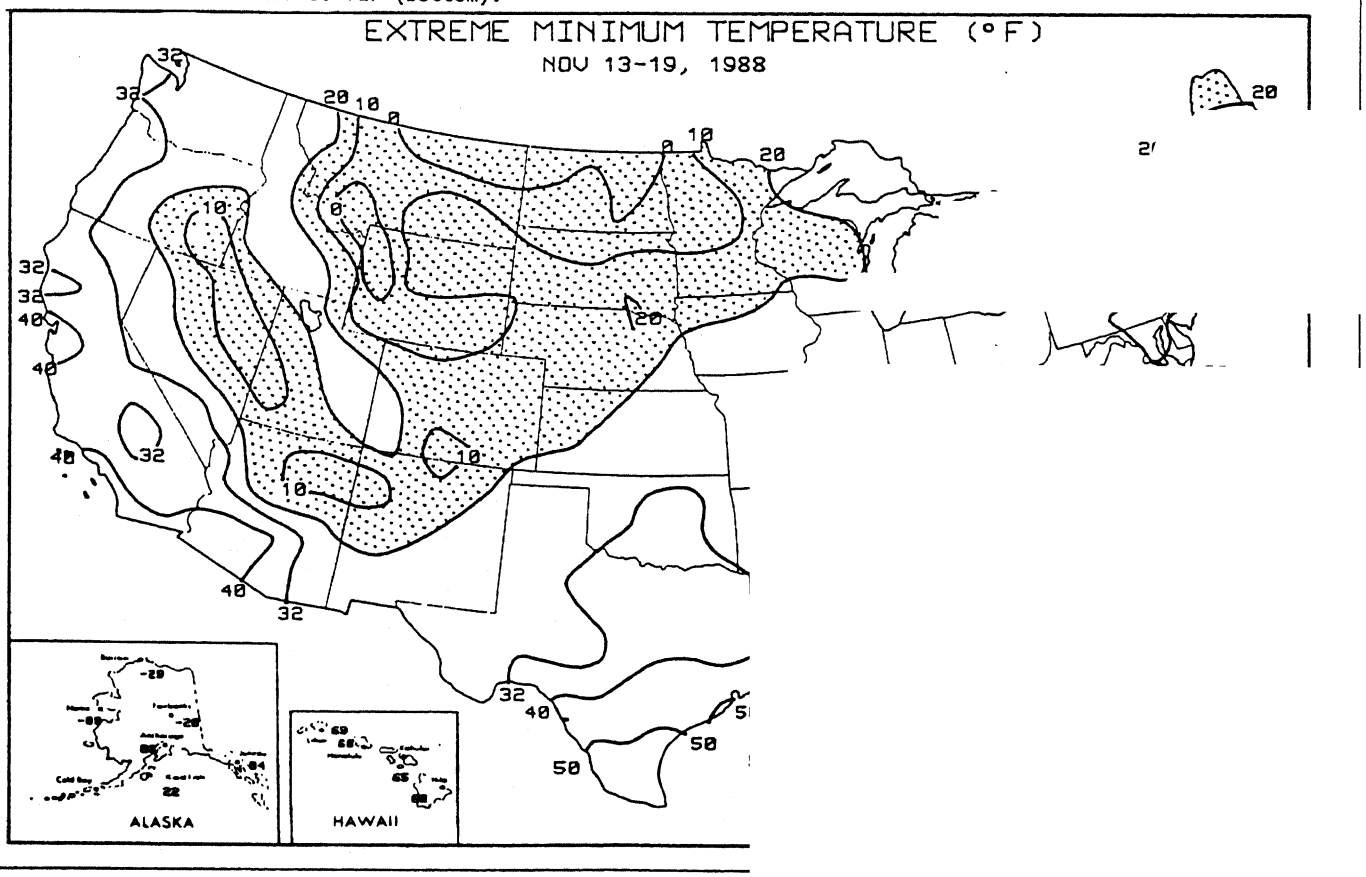
Station	TDepNml	AvgT(°F)	Station	TDepNml	AvgT(°F)
New Orleans (MSY), LA	+11.5	70.9	Gainesville, FL	+8.6	71.2
Baton Rouge, LA	+10.9	69.0	San Antonio, TX	+8.6	67.5
Tallahassee, FL	+10.4	68.5	Meridian, MS	+8.6	62.2
Lafayette, LA	+9.9	68.9	Keesler AFB, MS	+8.5	68.0
Apalachicola, FL	+9.7	70.1	England AFB, LA	+8.5	64.9
Hatteras, NC	+9.6	65.4	Brownsville, TX	+8.4	75.6
Valparaiso/Eglin, FL	+9.4	67.2	Austin, TX	+8.4	66.3
Pensacola, FL	+9.3	68.1	Tuscaloosa, AL	+8.4	60.7
Mobile, TX	+9.3	67.3	Houston, TX	+8.3	68.3
Beeville NAS, TX	+9.2	71.6	College Station, TX	+8.3	66.3
Tampa, FL	+9.1	75.4	Charleston, SC	+8.3	64.5
Jackson, MS	+9.1	63.1	Fort Myers, FL	+8.2	77.6
Burlington, IA	+9.1	47.1	McAllen, TX	+8.2	74.3
Kingsville NAS, TX	+8.9	73.2	Palacios, TX	+8.2	69.6
Alice, TX	+8.9	72.6	Lake Charles, LA	+8.2	67.7
Galveston, TX	+8.9	71.3	Madison, WI	+8.2	42.9
Greenwood, MS	+8.8	61.5	Orlando, FL	+8.0	74.6
Victoria, TX	+8.7	70.9			

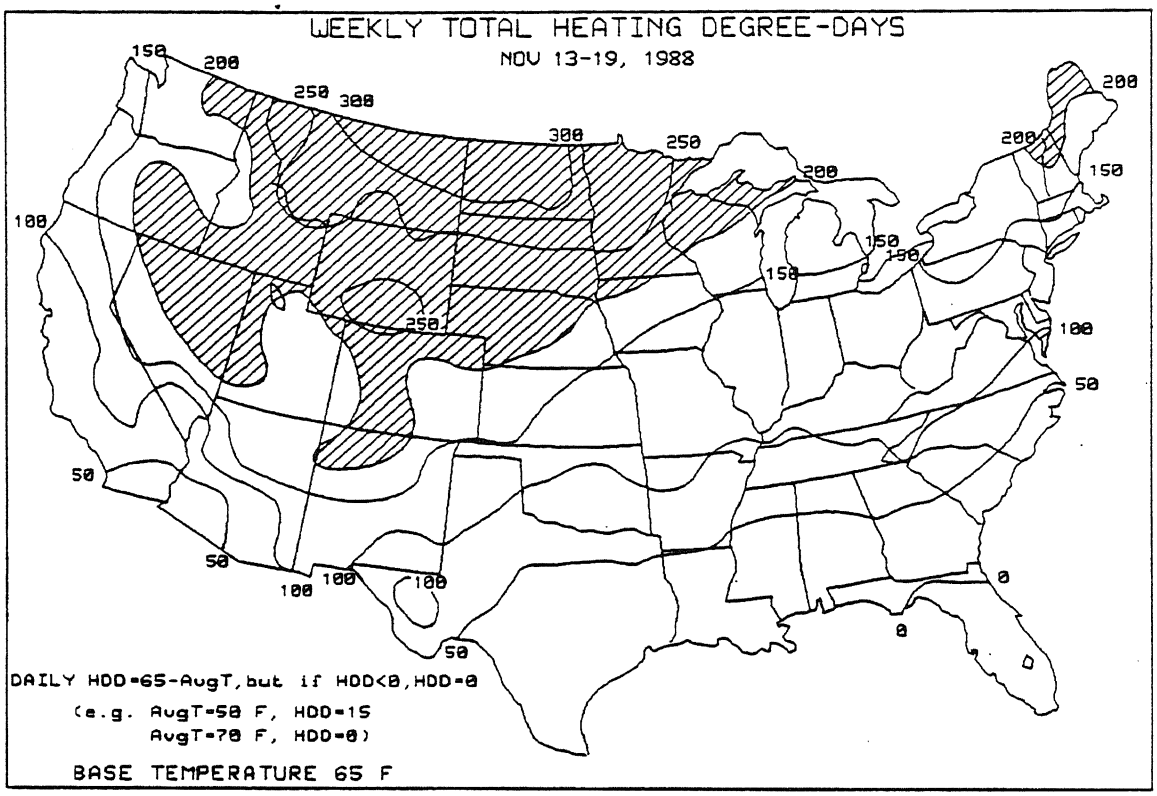
TABLE 3. Selected stations with temperatures averaging more
LOW normal for the week.

	TDepNml	AvgT(°F)
i, AK	-23.3	-23.6
	-15.1	-16.7
	-13.7	15.9
	-13.0	15.3
	-10.8	16.4
	-10.2	16.4
	-8.7	19.6
	-8.5	-8.7
	-7.9	18.7
	-7.7	-0.1
	-7.1	21.3
	-6.9	15.8
	-6.8	5.9
	-6.8	24.2
	-6.4	0.7
	-6.4	21.3
	-6.4	31.9
	-6.0	47.0

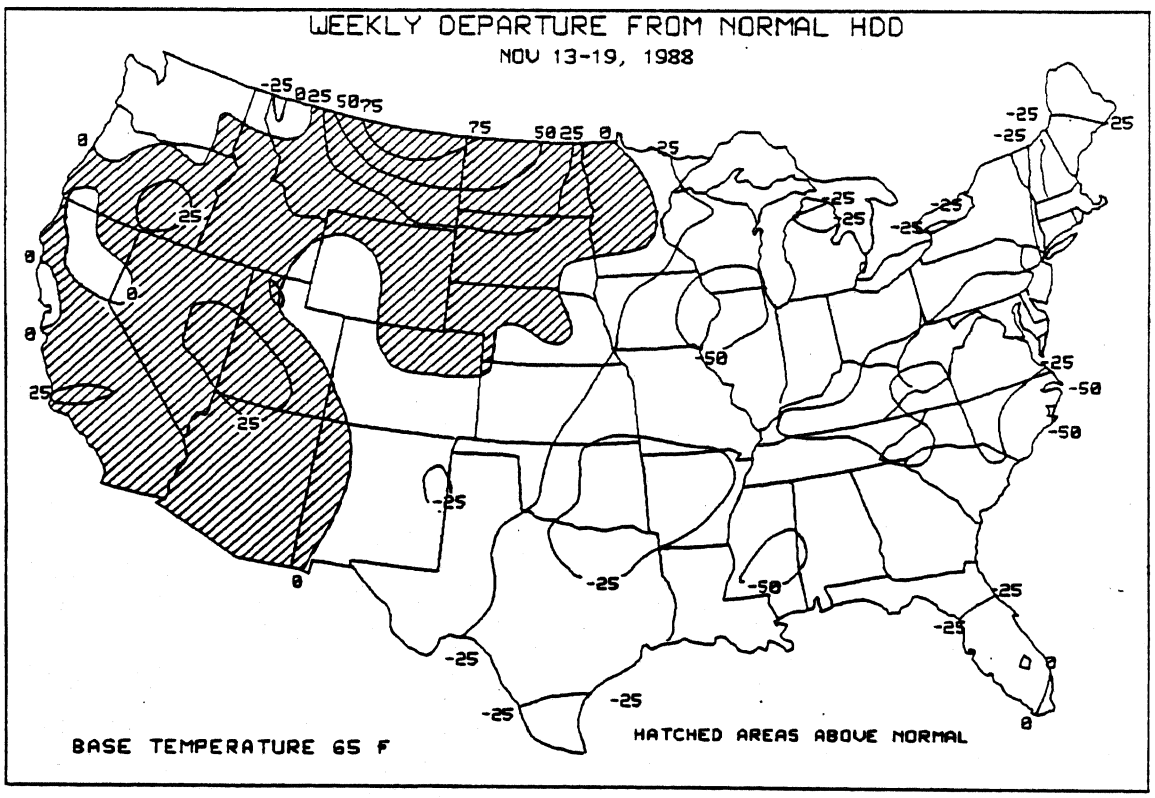


Subzero wind chills occurred across the eastern Rockies, the northern High Plains, and most of the Midwest last week as two strong storm systems moved through the region, leaving cold air and high winds in their wake (top). Temperatures below 20°F were primarily confined to northern sections of the Rockies, High Plains, and Midwest where the storms ushered in the season's coldest air so far (bottom).



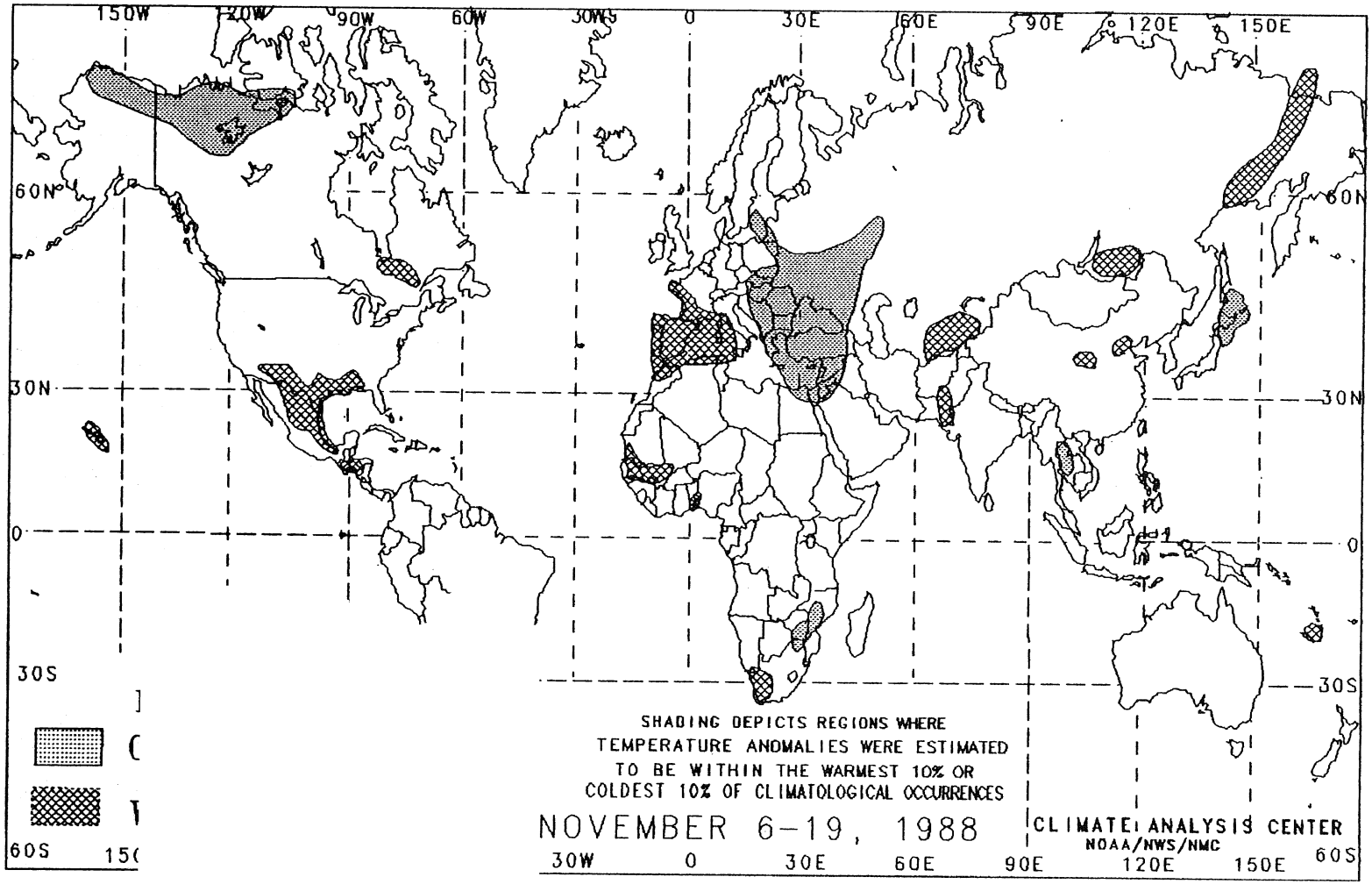


As cold air pushed into western sections of the nation, weekly heating usage exceeded 200 heating degree days (HDD) from the central and northern Rockies into the north central United States (top). Weekly U.S. HDD demand continued to be near to below normal, except in the northern Rockies and High Plains (bottom). Weekly departures of more than 75 HDD's occurred in northern Montana.



GLOBAL TEMPERATURE ANOMALIES

2 WEEKS



The anomalies on t
stations for which at le
from synoptic reports.
basis so many night tim
missing observations the
This in turn may have re
anomalies.

Temperature anoma
temperature departures fi

observing
received
our hour
f these
m bias.
me warm

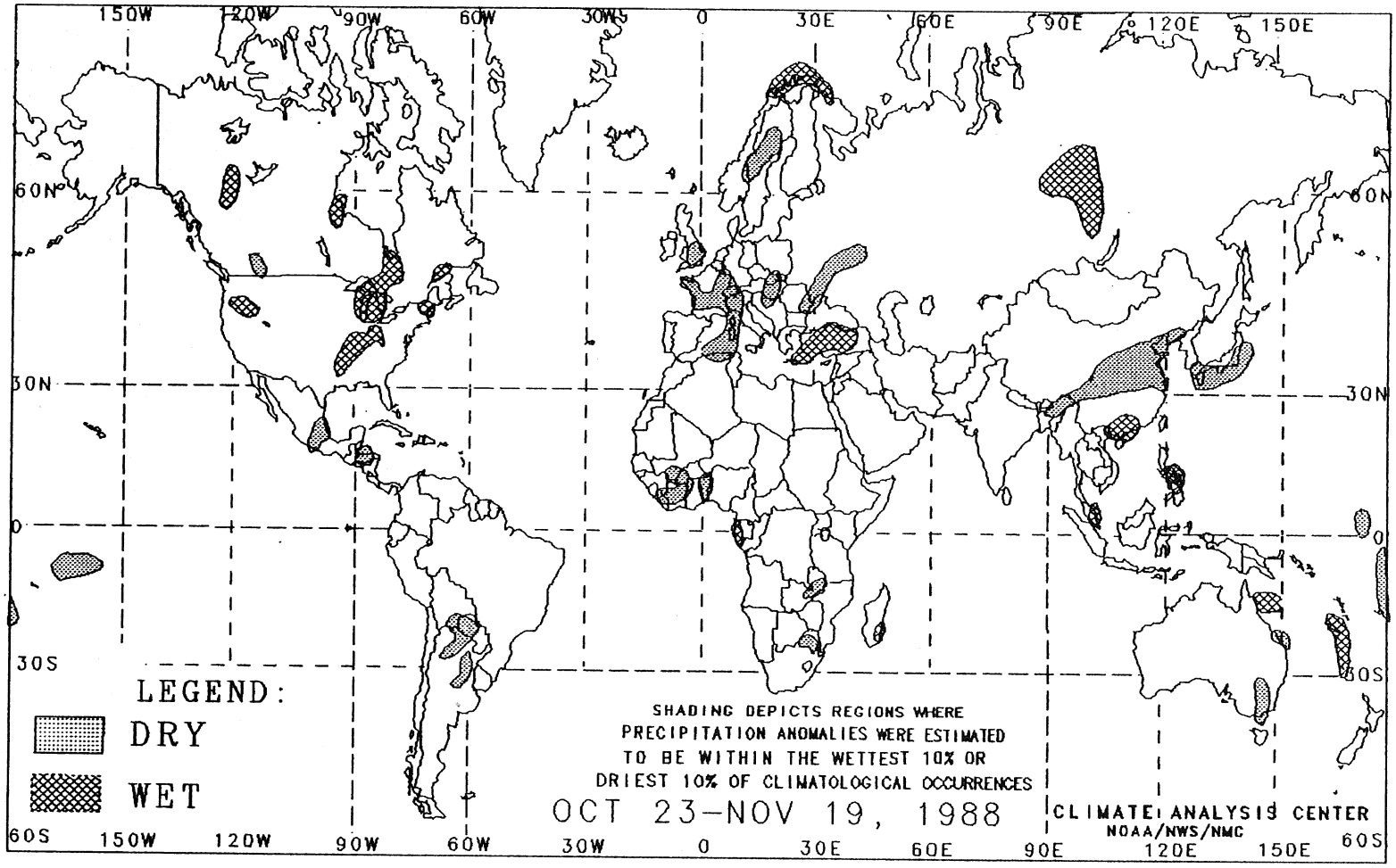
ude of

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data is insufficient for determining precentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of two week temperature anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

GLOBAL PRECIPITATION ANOMALIES

4 WEEKS



The anomalies on this chart are based on approximately 2500 observing stations for which at least 27 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

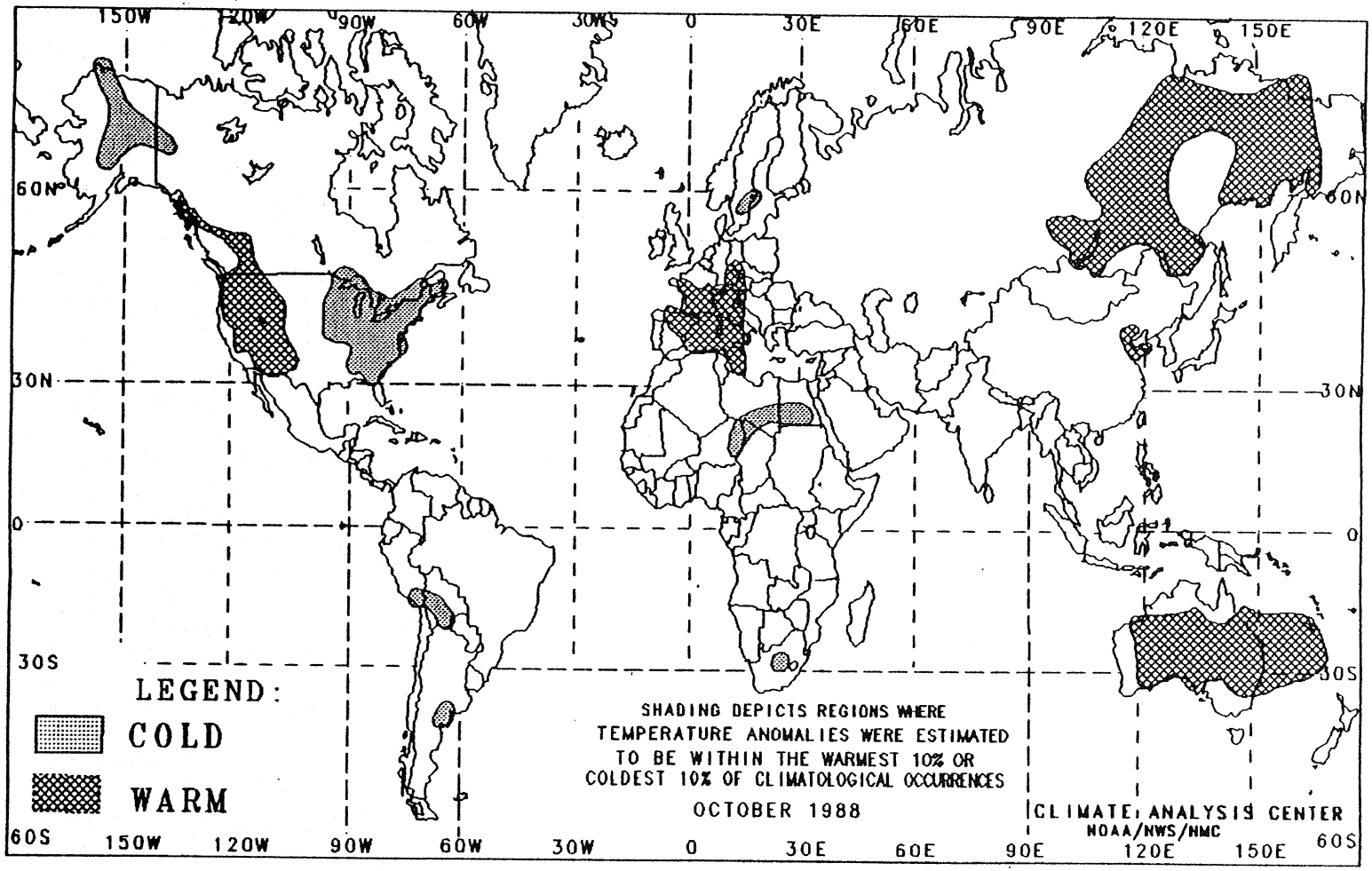
In climatologically arid regions where normal precipitation for the four week period is less than 20 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total four week precipitation exceeds 50 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data is insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

The chart shows general areas of four week precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

GLOBAL TEMPERATURE ANOMALIES

1 Month



The anomalies on this chart are based on approximately 2500 observing stations for which at least 26 days of temperature observations were received from synoptic reports. Many stations do not operate on a twenty-four hour basis so many night time observations are not taken. As a result of these missing observations the estimated minimum temperature may have a warm bias. This in turn may have resulted in an overestimation of the extent of some warm anomalies.

Temperature anomalies are not depicted unless the magnitude of temperature departures from normal exceeds 1.5°C.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data is insufficient for determining precentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

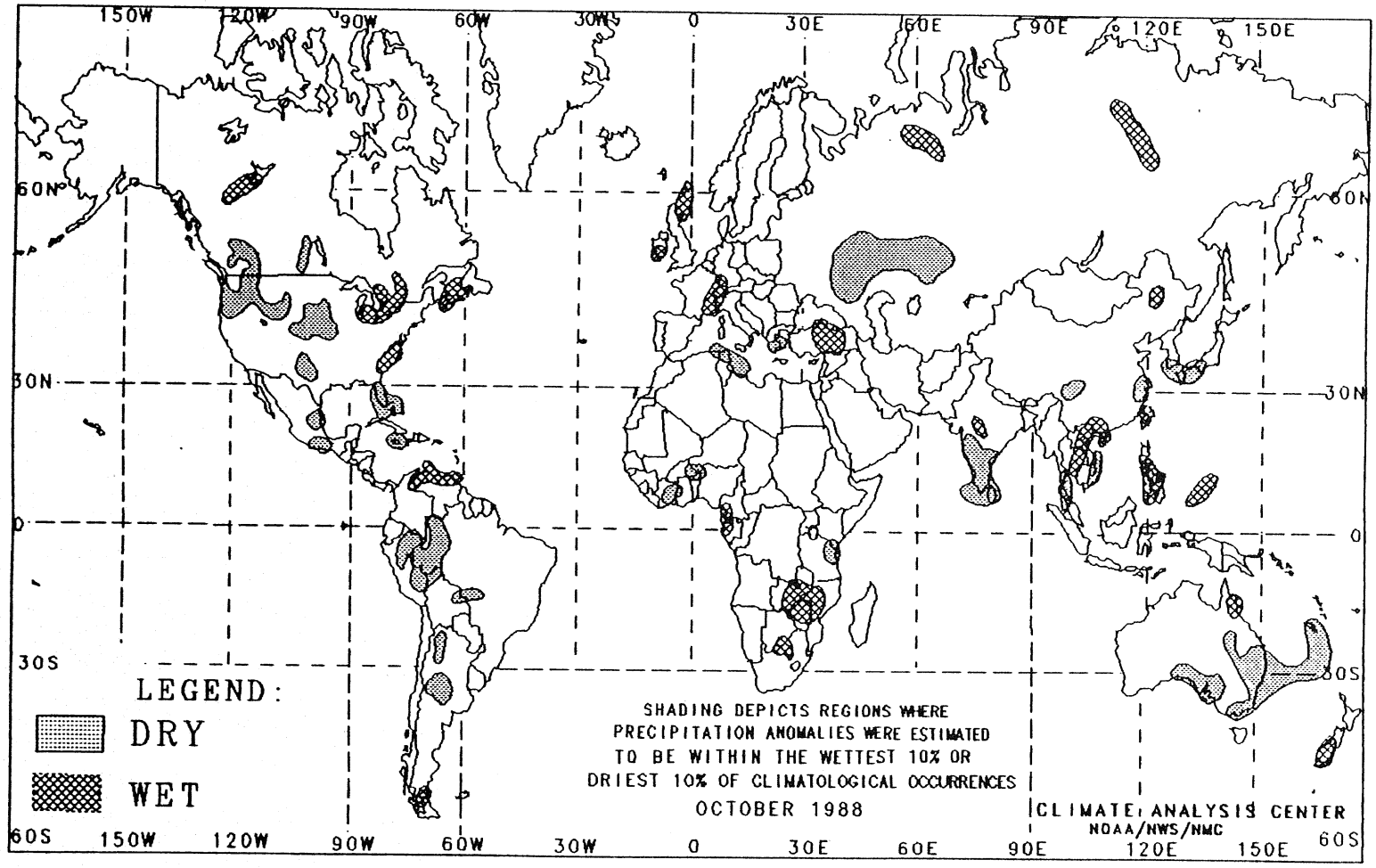
The chart shows general areas of one month temperature anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

PRINCIPAL TEMPERATURE ANOMALIES - OCTOBER 1988

REGIONS AFFECTED	TEMPERATURE AVERAGE (C)	DEPARTURE F/NORMAL (C)	COMMENTS
Alaska and West Central Yukon	-7 to -17	-3 to -7	COLD - 5 to 13 weeks
Southwestern Canada and Western United States	+6 to +28	+2 to +5	WARM - 6 to 13 weeks
Southeastern Canada and Eastern United States	+2 to +20	-2 to -4	COLD - 6 to 11 weeks
Bolivia and Peru	+9 to +23	-2 to -3	Very cold first half of October
East Central Argentina	+12 to +14	-2 to -3	Very cold middle of October
Southern Sweden	+5 to +6	Around -2	Very cold late October
Southwestern Europe and Northern Africa	+9 to +24	+2 to +5	Very warm early and late in October
Eastern Niger, Southern Libya, and Southern Egypt	+22 to +26	-2 to -3	Very cool first half of October
Central South Africa	+16 to +17	Around -2	COOL - 3 weeks
Eastern Siberia	-15 to +4	+2 to +8	MILD - 7 to 13 weeks
East Central China	+12 to +17	+2 to +3	WARM - 3 weeks
Australia, New Caledonia, and Off-Shore Islands	+17 to +32	+2 to +7	WARM - 4 to 13 weeks

GLOBAL PRECIPITATION ANOMALIES

1 Month



The anomalies on this chart are based on approximately 2500 observing stations for which at least 27 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the one month period is less than 20 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total one month precipitation exceeds 50 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data is insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

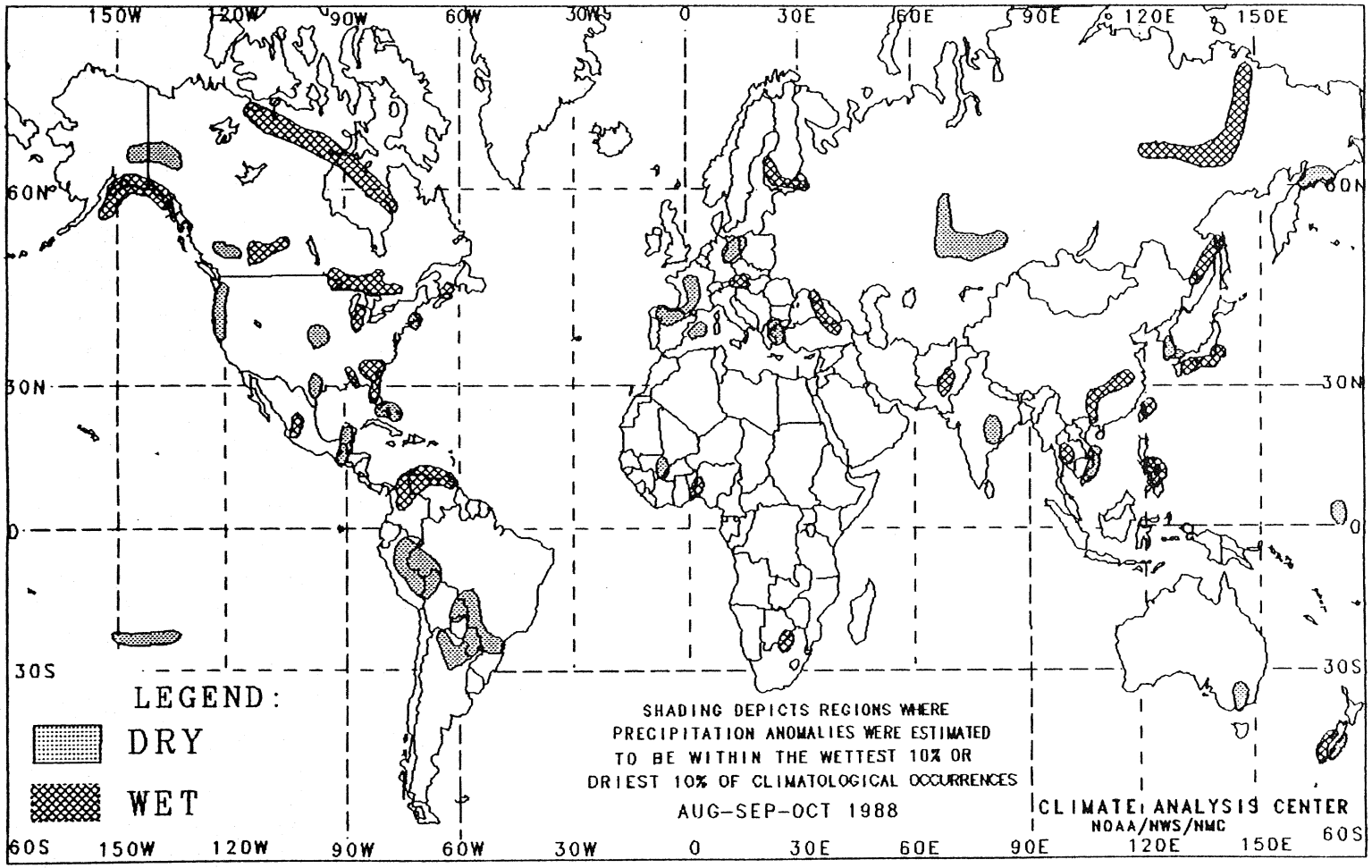
The chart shows general areas of one month precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.

PRINCIPAL PRECIPITATION ANOMALIES - OCTOBER 1988

REGIONS AFFECTED	PRECIPITATION TOTAL (MM)	PERCENT OF NORMAL	COMMENTS
West Central Canada	49 to 58	165 to 202	Heavy precipitation middle of October
Southeastern Saskatchewan	2 to 8	11 to 36	DRY - 4 to 5 weeks
Southwestern Canada and Northwestern United States	0 to 57	0 to 38	DRY - 5 to 13 weeks
Central United States	0 to 7	0 to 17	DRY - 4 to 13 weeks
Great Lakes Region	67 to 210	109 to 253	WET - 5 weeks
New Brunswick and Nova Scotia	120 to 251	113 to 287	Heavy precipitation second half of October
Texas	0 to 1	0 to 1	DRY - 5 to 9 weeks
Carolinas and Georgia	43 to 144	130 to 269	Heavy precipitation early October
Florida and Bahamas	2 to 38	4 to 21	DRY - 5 to 13 weeks
East Central Mexico	1 to 75	3 to 34	DRY - 6 to 10 weeks
Southern Mexico	0 to 37	0 to 44	DRY - 4 to 13 weeks
Jamaica	4 to 34	2 to 16	DRY - 13 weeks
Venezuela	69 to 373	110 to 532	Heavy precipitation first half of October
Western Brazil, Eastern Peru, and Northern Bolivia	9 to 135	17 to 69	DRY - 5 to 17 weeks
West Central Brazil	37 to 68	27 to 73	DRY - 13 weeks
Northern Argentina	0 to 4	0 to 8	DRY - 7 to 13 weeks
Central Argentina	0 to 22	0 to 28	DRY - 5 to 6 weeks
Southern Argentina and Southern Chile	54 to 57	250 to 495	Heavy precipitation middle of October
Northeastern Scotland	151 to 177	155 to 198	Heavy precipitation early October
Southern Ireland	210 to 266	167 to 263	Heavy precipitation middle of October
Eastern France and Western Switzerland	59 to 363	126 to 319	Heavy precipitation first half of October
Greece	1 to 84	2 to 77	DRY - 13 weeks
Turkey	51 to 257	121 to 445	WET - 6 to 13 weeks
Southwestern Soviet Union	0 to 31	0 to 79	DRY - 5 to 8 weeks
Northeastern Algeria, Northern Tunisia, and Northwestern Libya	0 to 10	0 to 55	DRY - 4 to 13 weeks

REGIONS AFFECTED	PRECIPITATION TOTAL (MM)	PERCENT OF NORMAL	COMMENTS
Ivory Coast	31 to 92	19 to 57	DRY - 5 to 8 weeks
Burkina Faso and Benin	0 to 3	0 to 12	DRY - 5 to 7 weeks
Equatorial Guinea, Cameroon, and Gabon	452 to 534	114 to 158	Heavy precipitation middle of October
Zambia, Malawi, Mozambique, and Zimbabwe	43 to 155	171 to 629	WET - 4 to 9 weeks
Tanzania	9 to 54	16 to 45	DRY - 5 to 9 weeks
North Central South Africa	83 to 144	233 to 352	WET - 5 to 13 weeks
Northwestern Siberia	33 to 74	172 to 204	Heavy precipitation second half of October
Central Siberia	41 to 44	165 to 200	WET - 5 weeks
Northeastern China	55 to 72	307 to 447	WET - 4 to 7 weeks
Central China	3 to 66	12 to 53	DRY - 5 weeks
Eastern China	2 to 18	3 to 36	DRY - 5 to 6 weeks
Northern Indochina, Eastern Thailand, and adjacent China	107 to 689	116 to 300	WET - 5 to 6 weeks
Korea and Japan	5 to 170	9 to 58	DRY - 6 to 13 weeks
Southern Thailand and Malaysia	13 to 287	26 to 57	DRY - 5 to 10 weeks
Vietnam	175 to 252	41 to 66	Heavy precipitation middle of October
Central India	113 to 135	294 to 318	WET - 7 weeks
Sri Lanka and Southern India	0 to 137	0 to 67	DRY - 4 to 12 weeks
Taiwan	648 to 1077	262 to 267	Heavy precipitation late October
Philippines	127 to 679	123 to 352	WET - 4 to 5 weeks
Yap and Koror	509 to 562	146 to 176	Heavy precipitation middle of October
Northeastern Australia	71 to 88	211 to 402	WET - 5 to 6 weeks
South Central Australia	0 to 10	0 to 24	DRY - 4 to 13 weeks
Eastern Australia, New Caledonia, and Off-Shore Islands	0 to 56	0 to 67	DRY - 4 to 10 weeks
New Zealand	137 to 457	161 to 185	Heavy precipitation early and late in October

3 Months

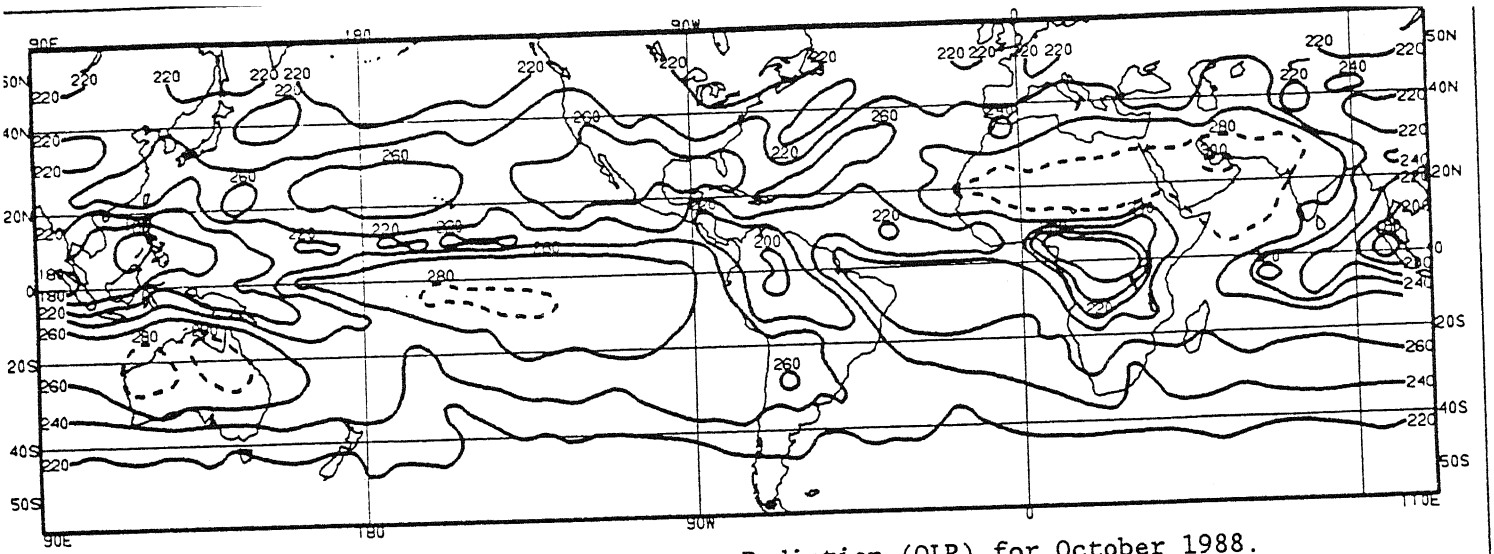


The anomalies on this chart are based on approximately 2500 observing stations for which at least 81 days of precipitation observations (including zero amounts) were received or estimated from synoptic reports. As a result of both missing observations and the use of estimates from synoptic reports (which are conservative), a dry bias in the total precipitation amount may exist for some stations used in this analysis. This in turn may have resulted in an overestimation of the extent of some dry anomalies.

In climatologically arid regions where normal precipitation for the three month period is less than 50 mm, dry anomalies are not depicted. Additionally, wet anomalies for such arid regions are not depicted unless the total three month precipitation exceeds 125 mm.

In some regions, insufficient data exist to determine the magnitude of anomalies. These regions are located in parts of tropical Africa, southwestern Asia, interior equatorial South America, and along the Arctic Coast. Either current data are too sparse or incomplete for analysis, or historical data is insufficient for determining percentiles, or both. No attempt has been made to estimate the magnitude of anomalies in such regions.

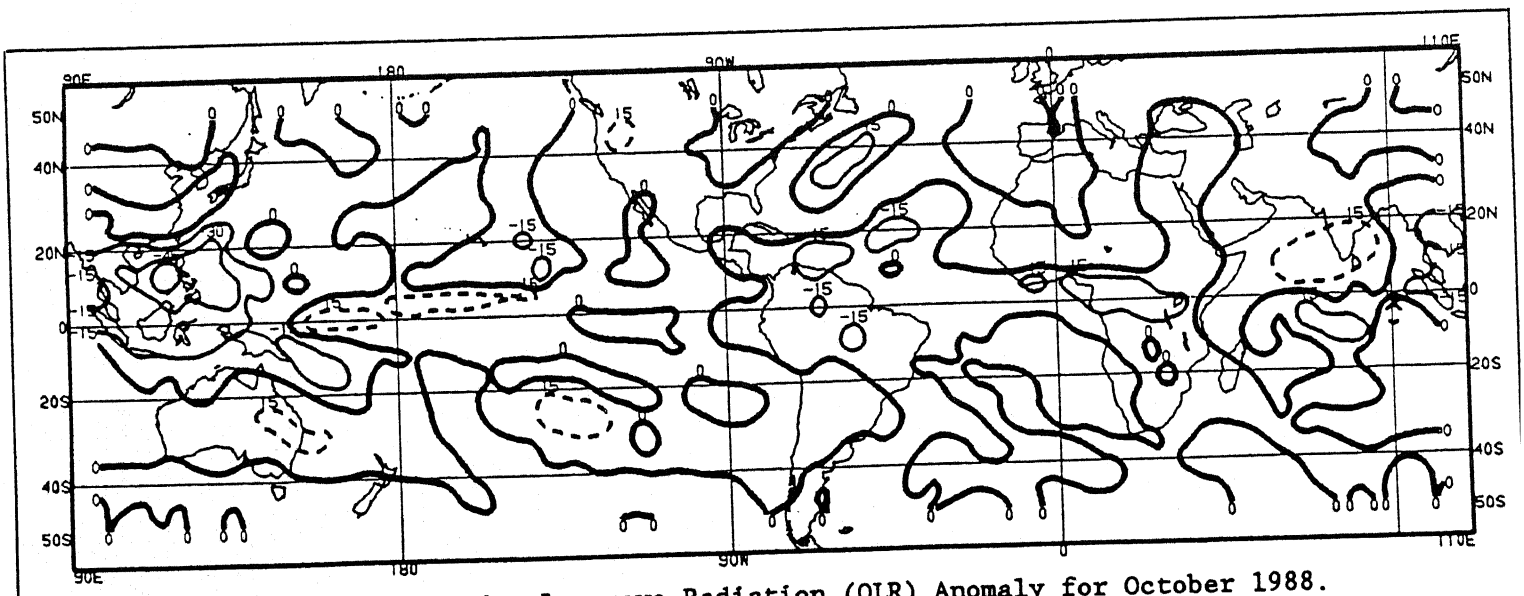
The chart shows general areas of three month precipitation anomalies. Caution must be used in relating it to local conditions, especially in mountainous regions.



Mean Monthly Outgoing Longwave Radiation (OLR) for October 1988.

The mean monthly outgoing long wave radiation (OLR) as measured by the NOAA-9 AVHRR IR window channel by NESDIS/SRL (top). Data are accumulated and averaged over 2.5° areas to a 5° mercator grid for display. Contour intervals are 20 Wm^{-2}, and contours of 280 Wm^{-2} and above are dashed. In tropical areas (for our purposes 20°N-20°S) that receive primarily convective rainfall, a mean OLR value of less than 220 Wm^{-2} is associated with significant monthly precipitation, whereas a value greater than 260 Wm^{-2} normally indicates little or no precipitation. Care must be used in interpreting this chart at higher latitudes, where much of the precipitation is non-convective, or in some tropical coastal or island locations, where the precipitation is primarily orographically induced. The approximate relationship between mean OLR and precipitation amount does not necessarily hold in such locations.

The mean monthly outgoing long wave radiation anomalies (bottom) are computed as departures from the 1974-1983 base period mean (1978 missing). Contour intervals are 15 Wm^{-2}, while positive anomalies (greater than normal OLR, suggesting less than normal cloud cover and/or precipitation) are dashed and negative anomalies (less than normal OLR, suggesting greater than normal cloud cover and/or precipitation) are solid.



Mean Monthly Outgoing Longwave Radiation (OLR) Anomaly for October 1988.